AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended)   A method for controlling a crane drive unit so as to suppress sway of a load suspended by a rope of a crane, which sway occurs when the load has been transported from a first position to a second position, the control being made by operating a controller having a filter unit using a feedforward control program, comprising:

removing a component near a resonance frequency by the filter unit from a transportation command for the load, in which command a maximum value among at least one of [[a]] transportation speed, transportation acceleration, and transportation jerk is limited, under the resonance frequency sequentially computed from a rope length that is a distance from the center of rotation of the sway of the rope to the center of gravity of the load and under parameters that relate to a control unit of the crane drive unit and that are previously computed so as not to exceed a performance of the crane drive unit;

wherein based on expression (1) or (2), the component near the resonance frequency is removed by using parameters a_i (f) and b_j (f), which are determined by ~~computing them in~~ under a constraint condition that each maximum value in the transportation command does not exceed a limitation of a maximum value of the crane drive unit ~~a simulation in which a model expressing the characteristics of the crane is used, while changing their values, and which values are stored~~,

Expression (1)

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$$y(t) = b_0(f)x(t) + b_1(f)x(t-1) + b_2(f)x(t-2) + \cdots - a_1(f)y(t-1) - a_2(f)y(t-2) - \cdots$$

$$y(t) = \sum_{j=0}^{m} b_j(f)x(t-j) - \sum_{i=1}^{n} a_i(f)y(t-i)$$

> where a_i (f) and b_j (f) are parameters mediated by the resonance
> frequency f sequentially computed for the varying length of the
> rope, and
>
> Expression (2)

$$F(S) = \frac{Y(S)}{X(S)} = \frac{b_0(f)S^0 + b_1(f)S^1 + b_2(f)S^2 + \cdots}{a_0(f)S^0 + a_1(f)S^1 + a_2(f)S^2 + \cdots} = \frac{\displaystyle\sum_{j=0}^{m} b_j(f)S^j}{\displaystyle\sum_{i=0}^{n} a_i(f)S^i}$$

> where expression (1) is obtained by carrying out a Z-transformation to the
> transfer function of the filter shown in expression (2), and S is a
> Laplacian operator, and
>
> inputting the transportation command from which the component near the
> resonance frequency is removed into the crane drive unit, thereby
> controlling the crane drive unit so that the load does not greatly
> sway when the load is transported from the first position to the
> second position.

2. (Currently Amended)   A system for controlling a crane drive unit so as to suppress
sway of a load suspended by a rope of a crane, which sway occurs when the
load has been transported from a first position to a second position, the control
being made by operating a controller having a filter unit using a feedforward
control program, comprising:

a rope length detection unit for detecting a rope length that is a distance
from the center of rotation of the sway of the rope to the center of
gravity of the load;

a resonance frequency computing unit for computing a resonance
frequency of the rope having said rope length;

a transportation command transmitting unit for transmitting a
transportation command for the load given by a transportation
command applicator;

a parameter computing unit for previously computing parameters for a
control unit of the crane drive unit so that the parameters do not
exceed a performance of the crane drive unit;

a parameter storing unit for receiving and storing the parameters from the
parameter computing unit;

a maximum value limiting unit for limiting a maximum value among at least
one of a transportation speed, transportation acceleration, and
transportation jerk in the transportation command for the load from
the transportation command transmitting unit under the parameters
from the parameter storing unit; and

a filter unit for receiving the resonance frequency from the resonance
frequency computing unit, the filter unit removing a component near
the resonance frequency from the transportation command in which
the maximum value is limited by the maximum value limiting unit,
under the parameters from the parameter storing unit, the filter unit
inputting in the crane drive unit the transportation command from
which the component near the resonance frequency is removed,

wherein based on expression (1) or (2), the component near the
resonance frequency is removed by using parameters a_i (f) and b_j
(f), which are determined by a simulation under a constraint

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condition that [[each]] maximum [[value]] <u>speeds</u> in the
transportation command [[does]] <u>do</u> not exceed a ~~limitation of~~ a
maximum [[value]] <u>speed</u> of the crane drive unit,

Expression (1)

$$y(t) = b_0(f)x(t) + b_1(f)x(t-1) + b_2(f)x(t-2) + \cdots - a_1(f)y(t-1) - a_2(f)y(t-2) - \cdots$$

$$y(t) = \sum_{j=0}^{m} b_j(f)x(t-j) - \sum_{i=1}^{n} a_i(f)y(t-i)$$

where $a_i(f)$ and $b_j(f)$ are parameters mediated by the resonance
frequency f sequentially computed for the varying length of the
rope, and

Expression (2)

$$F(S) = \frac{Y(S)}{X(S)} = \frac{b_0(f)S^0 + b_1(f)S^1 + b_2(f)S^2 + \cdots}{a_0(f)S^0 + a_1(f)S^1 + a_2(f)S^2 + \cdots} = \frac{\displaystyle\sum_{j=0}^{m} b_j(f)S^j}{\displaystyle\sum_{i=0}^{n} a_i(f)S^i}$$

where expression (1) is obtained by carrying out a Z-transformation to the
transfer function of the filter shown in expression (2), and S is a
Laplacian operator.

3. (Currently Amended)   A <u>non-transitory computer-readable</u> medium in which a
feedforward control program is stored, the feedforward control program
controlling a crane drive unit by a controller having a filter unit so as to suppress
sway of a load suspended by a rope of a crane, which sway occurs when the
load has been transported from a first position to a second position, the
feedforward control program being programmed to cause the filter unit of the
controller to remove a component near a resonance frequency from a
transportation command for the load, in which command a maximum value
among at least one of [[a]] transportation speed, transportation acceleration, and
transportation jerk is limited, under the resonance frequency sequentially
computed from a rope length that is a distance from the center of rotation of the
sway of the rope to the center of gravity of the load and under parameters for a
control unit of the crane drive unit, which parameters are previously computed so
as not to exceed a performance of the crane drive unit, the feedforward control
program [[being]] also ~~programmed to cause~~ <u>causing</u> the filter unit to input the
transportation command from which the component near the resonance
frequency is removed in the crane drive unit,

> wherein based on expression (1) or (2), the component near the
> resonance frequency is removed by using parameters a_i (f) and b_j
> (f), which are determined by ~~computing them in~~ a simulation <u>under</u>
> <u>a constraint condition that each maximum value in the</u>
> <u>transportation command does not exceed a limitation of a</u>
> <u>maximum value of the crane drive unit</u> ~~in which a model expressing~~
> ~~the characteristic of the crane is used, while changing their values,~~
> ~~and which values are stored,~~

> Expression (1)

$$y(t) = b_0(f)x(t) + b_1(f)x(t-1) + b_2(f)x(t-2) + \cdot \cdot \cdot - a_1(f)y(t-1) - a_2(f)y(t-2) - \cdot \cdot \cdot$$

$$y(t) = \sum_{j=0}^{m} b_j(f)x(t-j) - \sum_{i=1}^{n} a_i(f)y(t-i)$$

where a_i (f) and b_j (f) are parameters mediated by the resonance
frequency f sequentially computed for the varying length of the
rope, and

Expression (2)

$$F(S) = \frac{Y(S)}{X(S)} = \frac{b_0(f)S^0 + b_1(f)S^1 + b_2(f)S^2 + \cdots}{a_0(f)S^0 + a_1(f)S^1 + a_2(f)S^2 + \cdots} = \frac{\sum_{j=0}^{m} b_j(f)S^j}{\sum_{i=0}^{n} a_i(f)S^i}$$

where expression (1) is obtained by carrying out a Z-transformation to the
transfer function of the filter shown in expression (2), and S is a
Laplacian operator.

4-7. (Cancelled)